

ABSTRACT

The present invention relates to a decoding method and a decoder, a program, a recording-and-reproducing apparatus and a method, and a reproducing apparatus and a method that  
5 are suitable for decoding encoded data encoded by using a linear code on ring  $R$ . A low-density processing unit performs parity-check-matrix low-density processing, performs linear combination for rows of a parity check matrix included in an obtained reception word, and generates  
10 a parity check matrix according to the linear-combination result, thereby reducing the density of the parity check matrix used for decoding, at step S21. Then, at step S22, an LDPC decoding unit performs decoding by using a sum product algorithm (SPA) by using the parity check matrix  
15 whose density is reduced through the processing performed at step S21. Where the processing at step S22 is finished, the LDPC decoding unit finishes decoding for the reception word. The present invention can be used for an error-correction system.